

ABSTRACT

A fuel cell of the type having a membrane electrode assembly (MEA) interdisposed between a pair of bipolar plate assemblies. The MEA may have a convoluted configuration to maximize the effective surface area of the MEA for a given planar area. Each bipolar plate assembly includes a gas distribution layer of open cell conductive foam material which is divided into a plurality of generally parallel segments to define a plurality of generally parallel porous reactant paths. The segments are defined by selectively varying the porosity of the foam material and/or selectively varying the thickness of the foam material. The foam material may be a conductive graphite foam media or a conductive metallic foam media. Each bipolar plate assembly further includes a non-porous, conductive separator plate. The bipolar plate assembly distributes the reactant gases delivered via a manifold structure across the face of the MEA. A coolant layer may also be provided utilizing a segmented foam construction similar to that utilized in the gas distribution layers.